Ex-proof pressure relief valves
piloted, subplate or in line mounting - ATEX, IECEx, EAC, PESO or cULus

AGAM, ARAM
Ex-proof pressure relief valves equipped with solenoid pilot valve for venting or multiple pressure selection, certified for safe operation in hazardous environments with potentially explosive atmosphere.
Certifications:
• Multicertification ATEX, IECEx, EAC and PESO for gas group II 2G and dust category II 2D
• Multicertification ATEX and IECEx for gas group I M2 (mining)
• cULus North American certification for gas group C&D

The flameproof enclosure of solenoid prevents the propagation of accidental internal sparks or fire to the external environment.
The solenoid is also designed to limit the surface temperature within the classified limits.

AGAM: pressure relief, subplate mounting
Size: 10, 20, 32 - ISO 6264
Max flow: 200, 400, 600 l/min
Max pressure: 350 bar

ARAM: pressure relief, threaded connections
Size: G 3/4” and G 1 1/4”
Max flow: 350 and 500 l/min
Max pressure: 350 bar

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>20</th>
<th>20</th>
<th>210/100/100</th>
<th>M</th>
<th>AO</th>
<th>*</th>
<th>24DC</th>
<th>*</th>
<th>Seals material, see section 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex-proof pressure relief valves, piloted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- = NBR</td>
</tr>
<tr>
<td>AGAM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PE = FKM</td>
</tr>
<tr>
<td>subplate mounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BT = HNBR (1)</td>
</tr>
<tr>
<td>ARAM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>threaded connections</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Valve size:
10 = AGAM (ISO 6264)
20 = AGAM (ISO 6264)
32 = AGAM (ISO 6264)
20 = ARAM G 3/4”
32 = ARAM G 1 1/4”

Configuration, see section 7:
10 20 22
11 21 32

Max regulated pressure of first (second / third) setting, see section 6:
50 = 50 bar 100 = 100 bar
210 = 210 bar 350 = 350 bar

Solenoid threaded connection for cable gland fitting:
GK = GK-1/2” - not for cULus (4)
M = M20x1.5 - not for cULus
NPT = 1/2” NPT

Options (2):
E = external pilot
O = horizontal cable entrance (1)
V = regulating handweel for pressure adjustment
WP = manual override protected by metallic cap
Y = external drain

Certification type:
AO = Multicertification for Group II 2G / II 2D (3)
AO/M = Multicertification for Group I M2 (mining)
AO/UL = cULus North American certification

(1) Not for multicertification M group I (mining)
(2) For possible combined options, see 11.1
(3) The valves with Multicertification for Group II are also certified for Indian market according to PESO (Petroleum and Explosives Safety Organization). The PESO certificate can be downloaded from www.atos.com
(4) Approved only for the Italian market

⚠️ The pressure at T port makes difficult the manual override operation that can be possible only if its value is lower than 50 bar
2 CONFIGURATIONS AND HYDRAULIC SYMBOLS

3 GENERAL CHARACTERISTICS

Assembly position / location | Any position
Subplate surface finishing to ISO 4401 | Acceptable roughness index, Ra ≤0.8 recommended Ra 0.4 - flatness ratio 0.01/100
MTTd values according to EN ISO 13849 | 75 years, for further details see technical table P007
Ambient temperature | Standard = -20°C + 70°C /PE option = -20°C + 70°C /BT option = -40°C + 70°C
Storage temperature range | Standard = -20°C + 80°C /PE option = -20°C + 80°C /BT option = -40°C + 70°C
Surface protection | Zinc coating with black passivation - salt spray test (EN ISO9227) > 200h
Compliance | Explosion proof protection, see section 7
- Flame proof enclosure "Ex d"
- Dust ignition protection by enclosure "Ex e"
RoHs Directive 2011/65/EU as last update by 2015/65/EU
REACH Regulation (EC) n°1907/2006

4 HYDRAULIC CHARACTERISTICS

<table>
<thead>
<tr>
<th>Valve size</th>
<th>10</th>
<th>20</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max operating pressure [bar]</td>
<td>port P = 350</td>
<td>port T, Y = 210</td>
<td></td>
</tr>
<tr>
<td>Max regulated pressure [bar]</td>
<td>50</td>
<td>100</td>
<td>210</td>
</tr>
<tr>
<td>Pressure range [bar]</td>
<td>4-50; 6-100; 7-210; 8-350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max flow AGAM (1) [l/min]</td>
<td>200</td>
<td>400</td>
<td>600</td>
</tr>
<tr>
<td>Max flow ARAM (1) [l/min]</td>
<td>-</td>
<td>350</td>
<td>500</td>
</tr>
</tbody>
</table>

(1) see Q/Δp diagrams at section 12 and 13

5 ELECTRICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Valve type</th>
<th>AGAM-<strong>/10 ARAM-</strong>/10 one setting pressure + venting with de-energized solenoid</th>
<th>AGAM-<strong>/11 ARAM-</strong>/11 one setting pressure + venting with energized solenoid</th>
<th>AGAM-<strong>/22 ARAM-</strong>/22 two setting pressure without venting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage code</td>
<td>VDC ±10%</td>
<td>VAC 50/60 Hz ±10%</td>
<td></td>
</tr>
<tr>
<td>Power consumption at 20°C</td>
<td>8W</td>
<td>12W</td>
<td></td>
</tr>
<tr>
<td>Coil insulation</td>
<td>class H</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection degree with relevant cable gland</td>
<td>IP66/67 to DIN EN60529 raintight enclosure, UL approved</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duty factor</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) For alternating current supply a rectifier bridge is provided built-in the solenoid
For power supply frequency 60 Hz, the nominal supply voltage of solenoids 110AC and 230AC must be 115/60 and 240/60 respectively

6 SEALS AND HYDRAULIC FLUIDS

Seals, recommended fluid temperature
- NBR seals (standard) = -20°C + 60°C, with HFC hydraulic fluids = -20°C + 50°C
- FKM seals (PE option) = -20°C + 80°C
- HNBR seals (BT option) = -40°C + 60°C, with HFC hydraulic fluids = -40°C + 50°C

Recommended viscosity
- 15+100 mm²/s - max allowed range 2.8+500 mm²/s

Max fluid contamination level
- ISO4406 class 20/18/15 NAS1638 class 9, see also filter section at www.atos.com or KTF catalog

Hydraulic fluid | Suitable seals type | Classification | Ref. Standard |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral oils</td>
<td>NBR, FKM, HNBR</td>
<td>HL, HLP, HLPD, HVLP, HVLPD</td>
<td>DIN 51524</td>
</tr>
<tr>
<td>Flame resistant without water</td>
<td>FKM</td>
<td>HPDU, HPDR</td>
<td></td>
</tr>
<tr>
<td>Flame resistant with water</td>
<td>NBR, HNBR</td>
<td>HFC</td>
<td></td>
</tr>
</tbody>
</table>

The ignition temperature of the hydraulic fluid must be 50°C higher than the max solenoid surface temperature

(1) Performance limitations in case of flame resistant fluids with water:
- max operating pressure = 210 bar
- max fluid temperature = 50°C
### 7 CERTIFICATION DATA

<table>
<thead>
<tr>
<th>Valve type</th>
<th>AGAM-`/AO</th>
<th>ARAM-`/AO</th>
<th>AGAM-`/AO/M</th>
<th>ARAM-`/AO/M</th>
<th>AGAM-`/AO/UL</th>
<th>ARAM-`/AO/UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certifications</td>
<td>Multicertification Group II</td>
<td>ATEX IECEx EAC PESO</td>
<td>Multicertification Group I</td>
<td>ATEX IECEx</td>
<td>North American cULus</td>
<td>cULus</td>
</tr>
<tr>
<td>Solenoid certified code</td>
<td>OA</td>
<td>OA/M</td>
<td>OA/EC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type examination certificate (1)</td>
<td>ATEX: CESI 02 ATEX 014 IECEx: IECEx CES 00.10010x EAC: TC RUL C-T. 06.B.01784 PESO: P338131</td>
<td>ATEX: CESI 03 ATEX 057x IECEx: IECEx CES 12.0007x</td>
<td>20170324 - E366100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method of protection</td>
<td>ATEX, Ex IIC T6/T4/T3 Gb Ex II 2D Ex db I Mb PESO Ex II 2G Ex d IIC T6/T4 Gb</td>
<td>ATEX, Ex IIC T6/T4/T3 Gb Ex II 2D Ex db I Mb PESO Ex II 2G Ex d IIC T6/T4 Gb</td>
<td>UL 1203, Class I, Div I, Groups C &amp; D Class I, Zone I, Groups II A &amp; II B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature class</td>
<td>T5</td>
<td>T4</td>
<td>-</td>
<td>T6</td>
<td>T5</td>
<td></td>
</tr>
<tr>
<td>Surface temperature</td>
<td>≤ 85 °C</td>
<td>≤ 135 °C</td>
<td>≤ 150 °C</td>
<td>≤ 85 °C</td>
<td>≤ 100 °C</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature (2)</td>
<td>-40 + 45 °C</td>
<td>-40 + 70 °C</td>
<td>-20 + 70 °C</td>
<td>-40 + 55 °C</td>
<td>-40 + 70 °C</td>
<td></td>
</tr>
<tr>
<td>Cable entrance: threaded connection</td>
<td>vertical (standard) or horizontal (option /O)</td>
<td>G3 = G3K-1/2&quot;</td>
<td>M = M20x1,5 NPT = 1/2&quot; NPT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) The type examiner certificates can be downloaded from www.atos.com

(2) The solenoids Group II and cULus are certified for minimum ambient temperature -40°C

In case the complete valve must withstand with minimum ambient temperature of -40°C, select /BT in the model code

**WARNING:** service work performed on the valve by the end users or not qualified personnel invalidates the certification

### 8 EX PROOF SOLENOIDS WIRING

![Image](image.png)

- **Multicertification**
  - n°4 M4 locking torque 4Nm
  - cover with threaded connection for vertical cable gland fitting
  - cover with threaded connection for horizontal cable gland fitting
  - terminal board for cables wiring
  - standard manual override
  - screw terminal for additional equipotential grounding

- **cULus certification**
  - n°4 M4 locking torque 4Nm
  - cover with threaded connection for vertical cable gland fitting
  - cover with threaded connection for horizontal cable gland fitting
  - terminal board for cables wiring
  - standard manual override

**Pay attention to coil polarity**

- 1 = Col
- 2 = GND
- 3 = Col-

PCB 3 poles terminal board suitable for wires cross sections up to 2.5 mm² (max AWG14)
9 CABLE SPECIFICATION AND TEMPERATURE - Power supply and grounding cables have to comply with following characteristics:

### Multicertification Group I and Group II

<table>
<thead>
<tr>
<th>Max ambient temperature [°C]</th>
<th>Temperature class</th>
<th>Max surface temperature [°C]</th>
<th>Min cable temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
<td>Group II</td>
<td>Group I</td>
</tr>
<tr>
<td>45 °C</td>
<td>-</td>
<td>T6</td>
<td>150 °C</td>
</tr>
<tr>
<td>70 °C</td>
<td>-</td>
<td>T4</td>
<td>150 °C</td>
</tr>
</tbody>
</table>

### cULus certification:
- Suitable for use in Class I Division 1, Gas Groups C
- Armored Marine Shipboard Cable which meets UL 1309
- Tinned Stranded Copper Conductors
- Bronze braided armor
- Overall impervious sheath over the armor

Any Listed (UBVZ/UBVZ7) Marine Shipboard Cable rated 300 V min, 15A min. 3C 2,5 mm² (14 AWG) having a suitable service temperature range of at least -25°C to +110°C ("BT" Models require a temperature range from -40°C to +110°C)

**Note 1:** For Class I wiring the 3C 1,5 mm² AWG 16 cable size is admitted only if a fuse lower than 10 A is connected to the load side of the solenoid wiring.

---

9.1 Cable temperature

The cable must be suitable for the working temperature as specified in the "safety instructions" delivered with the first supply of the products.

### Multicertification

<table>
<thead>
<tr>
<th>Max ambient temperature [°C]</th>
<th>Temperature class</th>
<th>Max surface temperature [°C]</th>
<th>Min cable temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I</td>
<td>Group II</td>
<td>Group I</td>
</tr>
<tr>
<td>55 °C</td>
<td>T6</td>
<td>85 °C</td>
<td>100 °C</td>
</tr>
<tr>
<td>70 °C</td>
<td>T5</td>
<td>100 °C</td>
<td>100 °C</td>
</tr>
</tbody>
</table>

---

10 CABLE GLANDS only for Multicertification

Cable glands with threaded connections GK-1/2", 1/2"NPT or M20x1,5 for standard or armoured cables have to be ordered separately, see tech. table KX800

**Note:** a Loctie sealant type 545, should be used on the cable gland entry threads

---

11 OPTIONS

- **E** = External pilot option to be selected when the pilot pressure is supplied from a different line respect to the P main line. With option E the internal connection between port P and X of the valve is plugged. The pilot pressure must be connected to the X port available on the valve’s mounting surface or on main body (threaded pipe connection G ¼”).
- **O** = Horizontal cable entrance, to be selected in case of limited vertical space
- **V** = Regulating handwheel for pressure adjustment
- **WP** = Manual override protect by metallic cap
- **Y** = The external drain is mandatory in case the main line T is subjected to pressure peaks or it is pressurized. The Y drain port has a threaded connection G ¾” available on the pilot stage body.

### 11.1 Possible combined options:

REGULATED PRESSURE VERSUS FLOW DIAGRAMS based on mineral oil ISO VG 46 at 50°C

AGAM-10
AGAM-20
AGAM-32

MINIMUM PRESSURE VERSUS FLOW DIAGRAMS based on mineral oil ISO VG 46 at 50°C

ARAM-20
ARAM-32

AXM-10
AXM-20
AXM-32

FLOW RATE [l/min]
MIN. REGULATED PRESSURE [bar]
FLOW RATE [l/min]
14 INSTALLATION DIMENSIONS FOR AGAM [mm] - Multicertified and UL

ISO 6264: 2007 (see table P005)

Mounting surface: 6264-06-09-1-97

Fastening bolts:
4 socket head screws M12x35 class 12.9
Tightening torque = 125 Nm
Seals: 2 OR 123; 1 OR 109/70

Ports P, T: Ø = 14.5 mm
Ports X: Ø = 3.2 mm

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th>AGAM-10/10 10/11</th>
<th>AGAM-10/20 10/21</th>
<th>AGAM-10/22 10/32</th>
</tr>
</thead>
<tbody>
<tr>
<td>option /V</td>
<td>-</td>
<td>7,25</td>
<td>7,55</td>
</tr>
<tr>
<td>option /O</td>
<td>+0,25</td>
<td>+0,35</td>
<td></td>
</tr>
<tr>
<td>option /WP</td>
<td></td>
<td></td>
<td>+0,25</td>
</tr>
</tbody>
</table>

Valve’s bottom view
AGAM-20

ISO 6264: 2007 (see table P005)
Mounting surface: 6264-08-11-1-97

Fastening bolts:
4 socket head screws M16x50 class 12.9
Tightening torque = 300 Nm
Seals: 2 OR 4112; 1 OR 109/70
Ports P, T: Ø = 24 mm
Ports X: Ø = 3.2 mm

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th>AGAM-20/10</th>
<th>AGAM-20/20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7.65</td>
<td>8.75</td>
</tr>
<tr>
<td>AGAM-20/20/22</td>
<td>8.45</td>
<td>10.2</td>
</tr>
<tr>
<td>Option /V</td>
<td>-</td>
<td>+0.35</td>
</tr>
<tr>
<td>Option /O</td>
<td>+0.25</td>
<td></td>
</tr>
</tbody>
</table>

Valve’s bottom view

AGAM-20/10/*-AO
AGAM-20/11/*-AO

AGAM-20/20/*-AO
AGAM-20/21/*-AO

AGAM-20/22/*-AO

AGAM-20/22/*-AO

AGAM-20/32/*-AO

Option /O
Option /WP
ISO 6264: 2007 (see table P005)
Mounting surface: 6264-10-17-1-97
(with M20 fixing holes instead of standard M18)
Fastening bolts:
4 socket head screws M20x60 class 12.9
Tightening torque = 600 Nm
Seals: 2 OR 4131; 1 OR 109/70
Ports P, T: Ø = 28.5 mm
Ports X: Ø = 3.2 mm

X = port connection for external pilot
Y = port connection for external drain

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th>AGAM-32/10/32</th>
<th>AGAM-32/20/32</th>
<th>AGAM-32/22/32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option /V</td>
<td>9.05</td>
<td>10.05</td>
<td>9.85</td>
</tr>
<tr>
<td>Option /O</td>
<td>11.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Option /WP</td>
<td>+0.35</td>
<td>-</td>
<td>+0.25</td>
</tr>
</tbody>
</table>
**ARAM-20**

X = port connection for external pilot
Y = port connection for external drain

---


table

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ARAM-20/10</td>
<td>6.75</td>
<td></td>
</tr>
<tr>
<td>ARAM-20/20</td>
<td>8.45</td>
<td></td>
</tr>
<tr>
<td>ARAM-20/20</td>
<td>8.15</td>
<td></td>
</tr>
<tr>
<td>ARAM-20/22</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>Option /V</td>
<td></td>
<td>+0.35</td>
</tr>
<tr>
<td>Option /O</td>
<td></td>
<td>+0.25</td>
</tr>
</tbody>
</table>
### ARAM-32

![Diagram of ARAM-32 components]

<table>
<thead>
<tr>
<th>Mass [kg]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ARAM-32/10</td>
<td>7.05</td>
</tr>
<tr>
<td>ARAM-32/11</td>
<td>9.05</td>
</tr>
<tr>
<td>ARAM-32/20</td>
<td>8.55</td>
</tr>
<tr>
<td>ARAM-32/22</td>
<td>10.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Option</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>/V</td>
<td>+0.25</td>
</tr>
<tr>
<td>/O</td>
<td>+0.35</td>
</tr>
<tr>
<td>/WP</td>
<td></td>
</tr>
</tbody>
</table>

### RELATED DOCUMENTATION

- **X010** Basics for electrohydraulics in hazardous environments
- **X020** Summary of Atos ex-proof components certified to ATEX, IECEx, EAC, PESO
- **X030** Summary of Atos ex-proof components certified to cULus
- **EX900** Operating and maintenance information for ex-proof on-off valves
- **KX800** Cable glands for ex-proof valves
- **P005** Mounting surfaces for electrohydraulic valves